Project Investment Analysis -- Ten Year Flows

(in $000's)

Dairy --- Thermophilic 13.84%

Project Cost	$7,592	Loan %	75%
Markup %	0%		
Management Fee %	20%		
Builder Margin	$0	Borrowed	$4,194
Project Total $	$7,592	Term Yrs	10.00
Credits	$2,000	Interest Rate	3.00%
		Annual Loan Pmt	$492
		Income Tax Rate	0%
		A/Tax ROE Target	25%
		Income -- Inflation Rate	2.00%
		Expense -- Inflation rate	3.00%

Return on Investor Equity

B/Tax ROE	33.8%	Accelerated Writeoff	No
A/Tax ROE	33.8%	Depreciation Yrs	10

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	10 Year Total	20 Year Total
Income													
Electric Offset		$364	$371	$378	$386	$393	$401	$409	$418	$426	$434	$3,980	$8,832
Gas Offset		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Income		$1,658	$1,691	$1,725	$1,759	$1,794	$1,830	$1,867	$1,904	$1,942	$1,981	$18,153	$40,280
Total		$2,021	$2,062	$2,103	$2,145	$2,188	$2,232	$2,276	$2,322	$2,368	$2,416	$22,133	$49,113
Expense													
Repair & Maint		$104	$107	$110	$113	$117	$120	$124	$128	$132	$136	$1,191	$2,791
Management Fee		$227	$230	$233	$236	$238	$241	$244	$247	$249	$252	$2,397	$5,065
Other Expense		$781	$805	$829	$854	$880	$906	$933	$961	$990	$1,020	$8,959	$20,998
Total		$1,113	$1,142	$1,172	$1,203	$1,235	$1,267	$1,301	$1,335	$1,371	$1,407	$12,546	$28,854
Net Oper Revenue		$909	$920	$931	$942	$953	$964	$975	$986	$997	$1,008	$9,587	$20,259
Interest		$126	$115	$104	$92	$80	$68	$55	$42	$28	$14	$723	$723
Depreciation		$559	$559	$559	$559	$559	$559	$559	$559	$559	$559	$5,592	$5,592
Principal Payment		$366	$377	$388	$400	$412	$424	$437	$450	$463	$477	$4,194	$4,194
Taxable Income		$224	$246	$268	$291	$314	$338	$361	$385	$410	$435	$3,272	$13,944
B/Tax Cash Flow	($1,398)	$417	$428	$439	$450	$462	$473	$484	$495	$506	$517	$4,670	$15,342
Income Tax		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

This worksheet within the economic analysis model is used to evaluate financing and ownership alternatives for the project under consideration. Financial analysis is distinctly different from economic analysis. With economic analysis, returns are calculated based on total cash inflows and cash outflows, assuming that all investments are cash outflows and net incomes are cash inflows. Financial analysis allows for debt financing, equity percentages, credits, depreciation and its effect on taxation, and pre-tax versus after-tax analysis. The evaluation methodology is similar except that instead of total cash flows, equity flows are considered.

Generally speaking, if the economic Return on Investment (ROI) is greater than the interest rate on borrowed funds, financial leverage will be positive and Return on Equity (ROE) will be greater than the ROI. Financial leverage will make a good project better and a bad project worse.

Using this worksheet allows a project to be put into a form typically used by business decision-makers, where depreciation and tax effects are considered, as well as borrowing ratios and interest rates. Additionally, income and expense categories can be inflated over time.

In the table above, the project “base case” is used, and further modified by a number of considerations, including: 1) a grant (credit), 2) borrowing 75 percent of the cash requirement with a ten year term at 3% interest. The ownership structure is assumed to be a Limited Liability Company, so there is no tax effect to the project (only to the project owners). That scenario is carried forward to the next table, where the distribution of LLC earnings is considered.

Exhibit C-12– Evaluation of an Ownership Structure Alternative

Evaluation of LLC Earnings and Distributions

Dairy --- Thermophilic 13.84%

	Year 1	Year 5	Year 10	Year 15	Totals 10 Yr	Totals 20 Yr
Total ($000)						
Net Oper Income	$909	$953	$1,008	$1,062	$12,546	$28,854
Debt Service						
Interest	$126	$80	$14	$0	$723	$723
Principal	$366	$412	$477	$0	$4,194	$4,194
Depr	$559	$559	$559	$0	$5,592	$5,592
Tax	$0	$0	$0	$0	$0	$0
Cash Flow	$417	$462	$517	$1,062	$4,670	$15,342
Taxable to Partners	$224	$314	$435	$1,062	$3,272	$13,944
Producer Returns per Cow						
Net Oper Income	$75	$78	$83	$87	$1,033	$2,375
Debt Service						
Interest	$10	$7	$1	$0	$59	$59
Principal	$30	$34	$39	$0	$345	$345
Depr	$46	$46	$46	$0	$460	$460
Tax	$0	$0	$0	$0	$0	$0
Cash Flow	$34	$38	$43	$87	$384	$1,263
Taxable to Partners	$18	$26	$36	$87	$269	$1,148
Use Fee Paid	$40	$40	$40	$40	$400	$800
Net Taxable	($22)	($14)	($4)	$47	($131)	$348

Percent Ownership by Producers 50%

Exhibit C-13– Biogas Energy Production and Utilization

Btu Balance Table -- Daily

	Million Btu per Day						
Produced	295.2						100%
Through Generator	280.5			95%			
Electric Energy		98.2			35%		
Net Metered		0.0				0%	0%
Sold to Utility		98.2				100%	33%
GenSet Heat		182.3			65%		
Not Recoverable		45.6				25%	15%
Recovered		136.7				75%	
For Digester Heat			59.2			43%	20%
For On-Site Heat			0.0			0%	0%
Can't Use			77.5			57%	26%
Direct BioGas	14.8			5%			
For Digester Heat		0.0			0%		0%
For On-Site Heat		0.0			0%		0%
Sold		0.0			0%		0%
Not Utilized		14.8			100%		5%

The Btu balance table shown above is used to track what happens to the energy contained in the biogas that is produced in the anaerobic digester. It is shown both in daily Btus and in percentage of the total. Every Btu is accounted for in some manner, including a category for “not utilized”. This table is especially useful in attempting to find better efficiencies for the project. Ideally all of the energy produced would be put to some useful and income producing end.

The table shows that this project is expected to product 295.2 million Btus per day and that 95% of the energy will pass through the engine generator to product electricity. The other 5% is lost (flared) due to assumed downtime for maintenance, etc. Ideally there would be no loss at all. The engine generator is shown to have a conversion efficiency of 35% because 35% of the Btus, which pass through the generator, are converted to electricity. The other 65% is engine heat loss, but 75% of that engine heat is recoverable. It is first used to heat the incoming material to the digester (43%) and is then available for other uses. In total, 31% (26% plus 5%) of the energy available in the biogas is being lost or not utilized. If an economically viable use could be found for that energy, it would boost the financial returns of the project.

The energy necessary to heat the incoming material to the digester is calculated independently. If more heat were needed than is available by recovery from the generator, biogas would first be used for that purpose before being available for electricity production. That is a non-productive use for the biogas and should be avoided by reducing the water content of the digester feedstock, better insulation of the digester vessels, recovering more heat from the digester effluent or any other practical means.

From the standpoint of designing the project for optimum efficiency, the Btu Balance Table is a very useful source of information.

Exhibit C-14– Digester Material Balances Table (Part 1)

Material Balance Table

	Daily				Annual	
	Tons	Lbs	Gallons	Percent	Tons	Gallons
Loading						
Waste	338.05	676,100	81,458		123,388	29,732,108
Solids		110,415		16.33%		
Volatile		82,013		12.13%		
Free		28,403		4.20%		
Liquid		565,685		83.67%		
Parlor and Rain Water		704,088	84,830			30,962,884
Digester						
Sludge	690.09	1,380,188	166,288		251,884	60,694,992
Solids		110,415		8.00%		
Volatile		82,013		5.94%		
Free		28,403		2.06%		
Water		1,269,773	152,985	92.00%		
Destruction						
Sludge		41,006				
Solids		41,006				
Volatile		41,006				
Free		0				
Water		0				
Dewatering						
Digestate		1,339,181	161,347	4.49%		
Separated Residuals	To Handling	200,370		30.00%	36,568	
Solids		60,111			10,970	
Volatile		35,513			6,481	
Free		24,598			4,489	
Water		140,259	16,899		25,597	6,168,028
	lbs/100 lbs					
N	0.98	1,957	$391.37		357.12	$142,849
P2O5	0.51	1,028	$411.27		187.64	$150,115
K2O	0.78	1,572	$235.73		286.81	$86,043
			$1,038.37			$379,007
			$10.36	per ton		
Filtrate	To UF	1,138,811				
Solids		9,298		0.82%		
Dissolved		6,174				
Suspended		3,123				
Water		1,129,513	136,086			
Recycled to Makeup		0	0			
Discharged		1,129,513	136,086	94.50 gpm		49,671,365
						152.25 AF
	ppm			lbs/000gal		
N	1,522	1,734	$346.75	12.74	632,811	$126,562
P2O5	252	286	$114.59	2.11	104,564	$41,826
K2O	867	987	$148.08	7.25	360,339	$54,051
			$609.42			$222,439
			$4.48	per 1000 gal		

Exhibit C-15– Digester Material Balances Table (Part 2)

Material Balance Table

		Daily Lbs	Daily Gallons	Daily Percent	Annual Tons	Annual Gallons
Ultrafiltration						
Permeate -->	To RO	1,024,930	123,486	90.00%		
Solids						
Suspended		3		0.05%		
Dissolved		5,557		100.00%		
Water		1,019,370				44,827,709
To RO	ppm					
N	1,449	1,477		100.00%		
P2O5	207	211		100.00%		
K2O	804	819		100.00%		
Concentrate -->	Back To Digester			10.00%		
Solids						
Suspended		3,122		99.95%		
Dissolved	ppm	617				
N	2,270	256		14.79%		
P2O5	672	76		26.51%		
K2O	1,485	168		16.99%		
Water		112,951	13,609			4,967,136
Reverse Osmosis			123,486			
Permeate -->	To Discharge		116,675	95.00%		
Solids	ppm					
N	15	15		1.00%		
P2O5	2	2		1.00%		
K2O	8	8		1.00%		
Water		968,401				42,686,323
Concentrate -->	To Land Application		6,141	5.00%		
Water	ppm	50,968			lbs/000gal	2,241,385
N	28,696	1,463		99.00%	238	
P2O5	4,089	208		99.00%	34	
K2O	15,917	811		99.00%	132	
		$81.03	per 1000 gal		$181,616	

Exhibit C-16 Estimating Land Application Cost for Enriched Digester Effluent

Land Application	
Annual Gallons	2,241,385
Gal/trip	**3000**
Ave N/Acre	**125**
P2O5=	18
K2O=	69
Gal/A	525
Total Acres	4,271
Acre/Trip	5.72
Trips/Yr	747
Per wk @ 7 Mo	26.68
Per day@5 days	5.34
Application hourly cost	**$45**
Hours/Trip	**0.75**
Total Annual Hours	560
Annual Application Cost	$25,216
Per Cow	$4.15
Per 000 Gal	$11.25
Per Acre	$5.90
Fertilizer Value/A	$42.53
Total Cost/Acre	$48.43

Exhibit C-17– Liquid Handling Cost Comparison

Cost Comparison of UF/RO Option

	Cost Factors		Annual Costs	
	000 gal	Rate	Standard	With UF/RO
Standard				
Manure Transport			$166,303	
Land Application				
Custom Application	0	$0.00	$0	
Dairymen	49,671	$2.50	$124,178	
With UF/RO 95%				
Manure Transport **				$133,043
Land Application				
Custom Application	2,241	$12.50		$28,017
Dairymen	0	$2.50		
UF/RO Operating	42,586	$1.00		$42,586
Total			$290,481	$203,647
Per Cow			$47.82	$33.52

** Saves two minutes per 1000 gallons driver time.

This table is a comparative calculation of liquid handling cost with and without option of membrane separation of dissolved nutrients. Without the UFRO alternative, digester liquid would be returned to the dairymen in the same transport trailer that manure is hauled away and then it would have to be land-applied as is currently the practice. Land application cost includes the cost of agitation, pumping and hauling if necessary. With the UFRO alternative, there is no land application cost, other than pumping of the accumulated rainwater. With UFRO, there is an additional cost for operation of the system and for land applying the nutrient-dense liquid via spreader truck.

Exhibit C-18– Estimating Inbound Transportation Costs

King County Transport Costs

No. Locations	15	Lbs/Gal	8.3
Ave Cows	405	Avg Load tons	37.35
Ave Waste Gal/cow/day	30	Annual Tons	276,063
Total daily gallons	182,250		
Ave Load gallons	9,000	Driver Hourly	$15.00
Ave trips/day	20.25	Tractor $/Mi	$1.00
Ave Haul miles (one way)	2.50		
Ave Road speed	12	Annual Driver	$129,347
Turnaround (minutes/000g)	5	Annual Tractor	$36,956
Ave Min/Trip	70.00	Total	$166,303
Ave miles/day	101.25	Per mile	$4.50
Annual Hours	8,623	Per 1000 Gal	**$2.50**
Annual trips	7,391	Per Cow	**$27.38**
Annual miles	36,956	Per Trip	**$22.50**
		Per Ton	**$0.60**
		Per ton-mile (one way)	**$0.241**

Exhibit C-19– Methodology for Estimating Carbon Credits

Estimating Baseline Methane Emissions for the King County Project

6,000	Head		Handling	Methane	
1,400	Ave Live Wt	Method	Pct	of Pot	
8,400,000	Live Lbs				
3.65	Annual VS lbs/lb bod wt	An Lagoon	50.00%	90.00%	45.00%
30,660,000	Annual lbs VS	Liq Slurry	50.00%	15.50%	7.75%
3.84	FT3 CH4/lb VS	Daily Spread	0.00%	0.20%	0.00%
117,734,400	Total CH4 Potential (FT3)	Total			52.75%
52.75%	Handling Factor for Enumclaw Plateau				
62,104,896	FT3 CH4/lb VS				
42.28	lbs/1000 CH4				
2,625,795	lbs CH4				
1,191	MT CH4				
22	GHG equivalency				
26,198	MT CO2e				

This methodology is based on AgStar program factors for potential methane emissions from various handling methods and the breakdown, by type, of handling method in the state of Washington. As shown in the right hand portion of the table, the calculation assumes that anaerobic lagoons emit 90% of the total potential methane of the waste stream, while handling manure as a liquid slurry allows only 15% of the potential methane to be emitted. The assumption is that half the waste is handled as liquid slurry and half via anaerobic lagoon. Extending the emissions by method times the percentage of each method determines overall percentage of potential methane emissions that would be allowed under standard handling practices. In this case, 52.75% of the potential methane emissions would be allowed under standard handling practices.

In the left side of the table, total potential methane emissions are calculated based on number of animals, volatile solids production per unit of body weight and chemical conversions. Potential emissions are reduced according to the standard handling practice and then multiplied by the greenhouse gas equivalency factor of methane to give the potential GHG emissions resulting from the standard manure handling practices in Washington.

This methodology does not attempt to calculate all of the details of GHG emissions as will be required for their validation trading of emissions credits. However, methane is the primary component and it can be reasoned that the additionally detailed calculations will add to the potential after the complete balance sheet is completed.

Exhibit C-20– Site Layout Example for Estimating Acreage Requirements

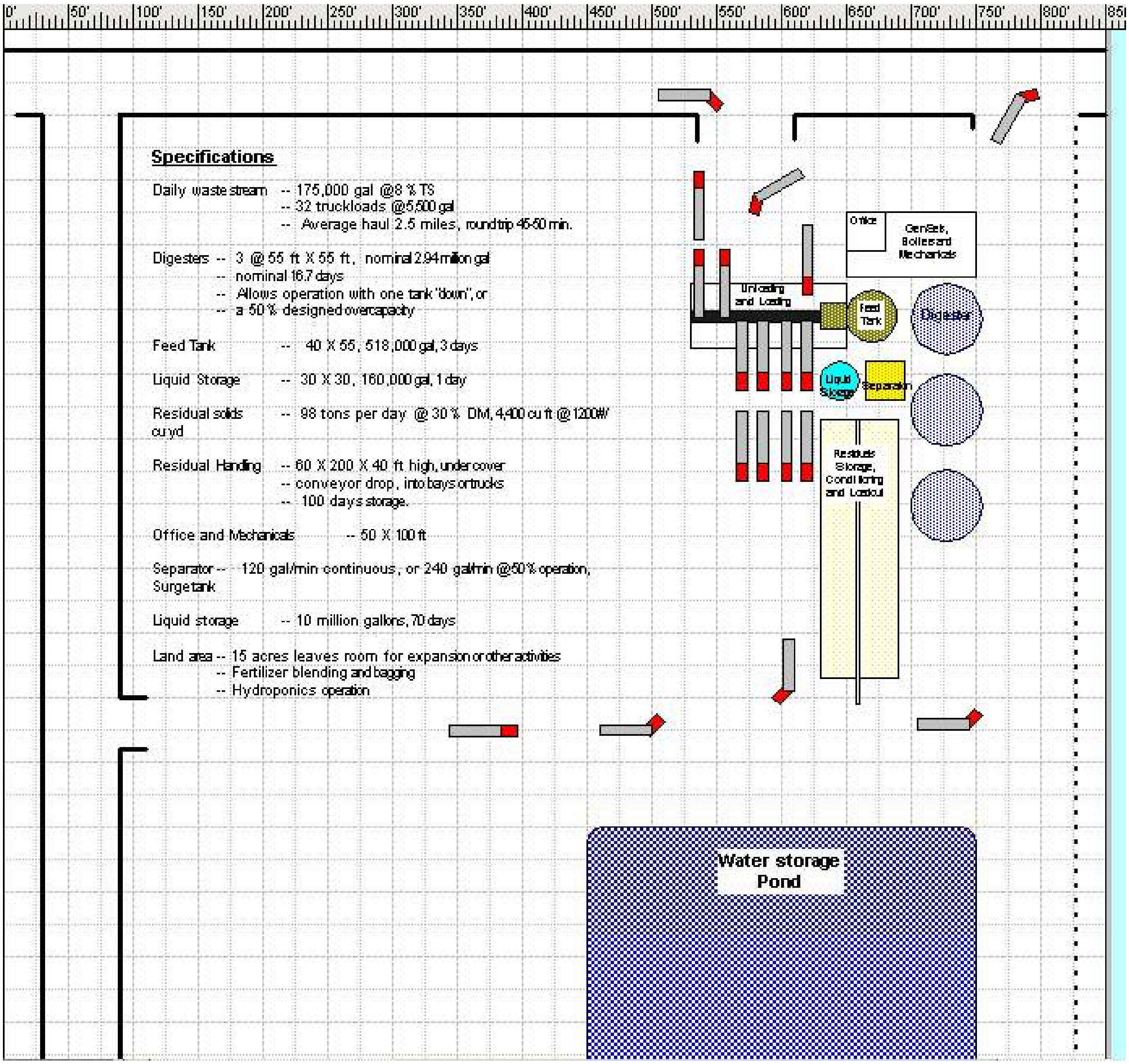
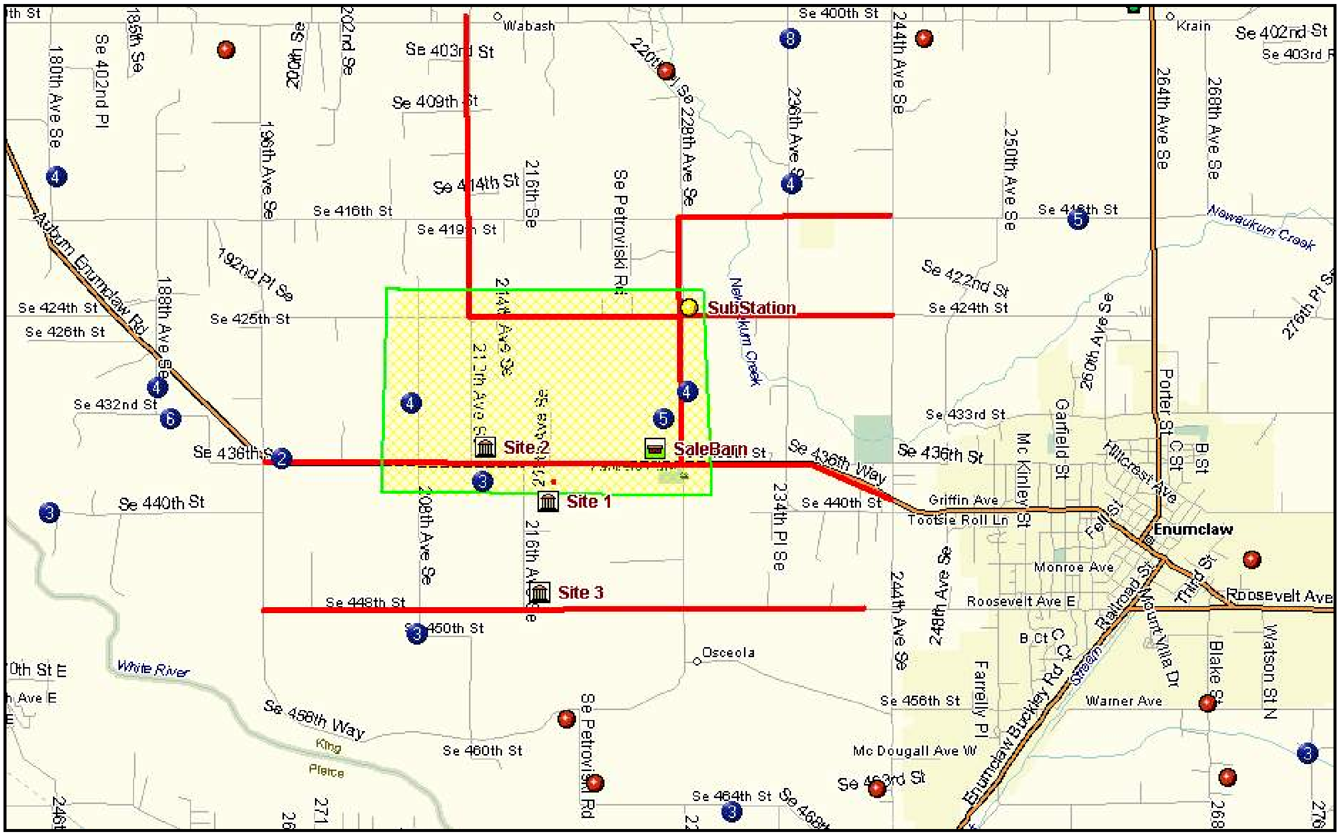


Exhibit C-21– Site Map for Centralized Waste Conversion Project



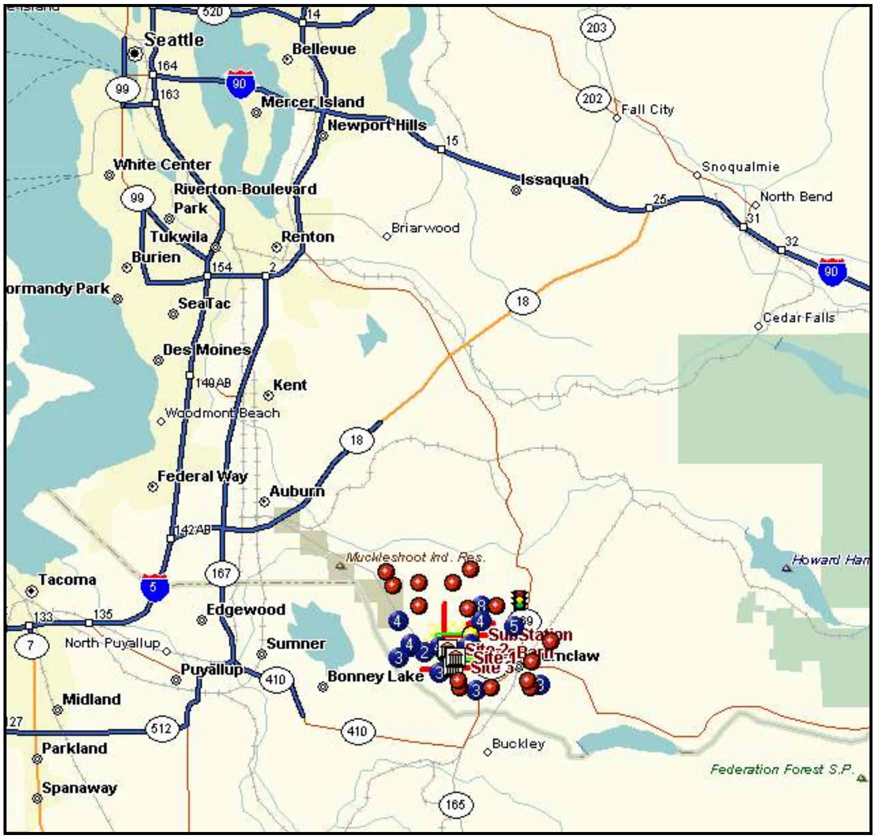

Seattle
Bellevue
Mercer Island
Newport Hills
Fall City
Snoqualmie
North Bend
Issaquah
White Center
Riverton-Boulevard Park
Tukwila
Burien
Renton
Briarwood
Normandy Park
SeaTac
Cedar Falls
Des Moines
Kent
Woodmont Beach
Federal Way
Auburn
Muckleshoot Ind. Res.
Howard Han
Tacoma
Edgewood
North Puyallup
Sumner
Puyallup
Bonney Lake
Midland
Parkland
Spanaway
Buckley
Federation Forest S.P.
SubStation
Site 1
Site 3

Exhibit C-22– Aerial Photo of Potential Project Site